

Amendment and Response under 37 C.F.R. 1.116

Applicant: Mark Hirst, et al.

Serial No.: 10/685,322

Filed: October 14, 2003

Docket No.: 200309706-1

Title: IMAGE DEVICE COOLING SYSTEM**RECEIVED
CENTRAL FAX CENTER****NOV 21 2006****IN THE CLAIMS**

Please cancel claims 1, 12, 24, and 34 without prejudice.

Please amend claims 6, 7, 9-11, 17-19, 21-23, 28, 29, 31-33, 38, 39, 41-43, 44, 45, and 47 as follows:

1. (Cancelled)
2. (Cancelled)
3. (Previously Presented) A cooling system in a print imaging device having an element that generates heat, the cooling system comprising:
 - a thermoelectric generator thermally coupled to the element to convert heat from the element to electrical energy;
 - a cooling device powered by the electrical energy to thereby cool the print imaging device; and
 - a controller adapted to receive and configured to monitor a level of electrical energy from a power supply internal to the imaging device, configured to receive the electrical energy from the thermoelectric generator, and configured to cause the cooling device to be normally powered by the electrical energy from the power supply and to be alternately powered by the electrical energy from the thermoelectric generator upon detecting the level of electrical energy from the power supply is substantially at or below a threshold level.
4. (Original) The cooling system of claim 3, wherein the threshold level is substantially equal to zero.
5. (Original) The cooling system of claim 3, wherein the controller is further configured to cause the cooling device to be alternately powered by the electrical energy from the thermoelectric generator upon detecting that electrical energy from the thermoelectric generator is at a level greater than the level of electrical energy from the power supply.

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6. (Currently Amended) The cooling system of claim 13, wherein the thermoelectric generator comprises:
 - a Peltier device operating in a Seebeck mode.
7. (Currently Amended) The cooling system of claim 13, wherein a first surface of the thermoelectric generator is mechanically coupled and thermally coupled to a housing of the imaging device and a second surface is thermally coupled only to the print element to thereby allow removal of the print element from the imaging device.
8. (Original) The cooling system of claim 7, wherein a heat conducting elastomer has a first major surface adhered to the second surface of the thermoelectric generator and a second major surface that contacts the print element.
9. (Currently Amended) The cooling system of claim 13, wherein the electrical energy comprises a voltage.
10. (Currently Amended) The cooling system of claim 13, wherein the cooling device is configured to reduce the temperature of the element.
11. (Currently Amended) The cooling system of claim 13, wherein the cooling device comprises at least one exhaust fan to generate an air flow.
12. (Cancelled)
13. (Previously Presented) A print imaging system comprising:
 - a heat source;
 - a cooling system comprising:
 - a thermoelectric generator thermally coupled to the heat source to convert heat from the heat source to electrical energy; and
 - a cooling device powered by the electrical energy to thereby cool the print imaging system; and

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a controller adapted to receive and configured to monitor a level of electrical energy from a power supply internal to the imaging system, configured to receive the electrical energy from the thermoelectric generator, and configured to cause the cooling device to be normally powered by the electrical energy from the power supply and to be alternately powered by the electrical energy from the thermoelectric generator upon detecting the level of electrical energy from the power supply is substantially at or below a threshold level.

14. (Original) The imaging system of claim 13, wherein the threshold level is substantially equal to zero.

15. (Original) The imaging system of claim 13, wherein the controller is further configured to cause the cooling device to be alternately powered by the electrical energy from the thermoelectric generator upon detecting that electrical energy from the thermoelectric generator is at a level greater than the level of electrical energy from the power supply.

16. (Cancelled)

17. (Currently Amended) The imaging system of claim ~~12~~13, wherein the heat source comprises a print element ~~comprises a fuser~~.

18. (Currently Amended) The imaging system of claim ~~12~~13, wherein the thermoelectric generator comprises:

a Peltier device operating in a Seebeck mode.

19. (Currently Amended) The imaging system of claim ~~12~~13, wherein a first surface of the thermoelectric generator is mechanically coupled and thermally coupled to a housing of the print imaging system and a second surface is thermally coupled only to the print element.

20. (Previously Presented) The imaging system of claim 19, wherein a heat conducting elastomer has a first major surface adhered to the second surface of the thermoelectric generator and a second major surface that contacts the print element.

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21. (Currently Amended) The imaging system of claim ~~12~~13, wherein the electrical energy comprises a voltage.
22. (Currently Amended) The imaging system of claim ~~12~~13, wherein the cooling device is configured to reduce the temperature of the print element.
23. (Currently Amended) The imaging system of claim ~~12~~13, wherein the cooling device comprises at least one exhaust fan that generates an air flow.
24. (Cancelled)
25. (Previously Presented) A laser printer comprising:
a fuser that generates heat;
a cooling system comprising:
a thermoelectric generator thermally coupled to the fuser to convert heat from the fuser to electrical energy; and
a cooling device powered by the electrical energy to thereby cool the laser printer; and
a controller adapted to receive and configured to monitor a level of electrical energy from a power supply internal to the laser printer, configured to receive the electrical energy from the thermoelectric generator, and configured to cause the cooling device to be normally powered by the electrical energy from the power supply and to be alternately powered by the electrical energy from the thermoelectric generator upon detecting the level of electrical energy from the power supply is substantially at or below a threshold level.
26. (Original) The laser printer of claim 25, wherein the threshold level is substantially equal to zero.
27. (Original) The laser printer of claim 25, wherein the controller is further configured to cause the cooling device to be alternately powered by the electrical energy from the

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thermoelectric generator upon detecting that electrical energy from the thermoelectric generator is at a level greater than the level of electrical energy from the power supply.

28. (Currently Amended) The laser printer of claim 2425, wherein the thermoelectric generator comprises:

a Peltier device operating in a Seebeck mode.

29. (Currently Amended) The laser printer of claim 2425, wherein the thermoelectric generator has a first surface mechanically coupled and thermally coupled to a housing of the laser printer and a second surface thermally coupled only to the fuser to thereby allow removal of the print fuser from the imaging device.

30. (Original) The laser printer of claim 29, wherein a heat conducting elastomer has a first major surface adhered to the second surface of the thermoelectric generator and a second major surface that contacts the fuser.

31. (Currently Amended) The laser printer of claim 2425, wherein the electrical energy comprises a voltage.

32. (Currently Amended) The laser printer of claim 2425, wherein the cooling device is configured to reduce the temperature of the fuser.

33. (Currently Amended) The laser printer of claim 2425, wherein the cooling device comprises at least one exhaust fan that generates an air flow.

34. (Cancelled)

35. (Previously Presented) A fuser system comprising:
a fuser assembly that generates heat;
a cooling system comprising:

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a thermoelectric generator thermally coupled to the fuser to convert heat from the fuser to electrical energy; and

a cooling device powered by the electrical energy to thereby cool the fuser assembly; and

a controller adapted to receive and configured to monitor a level of electrical energy from a power supply, configured to receive the electrical energy from the thermoelectric generator, and configured to cause the cooling device to be normally powered by the electrical energy from the power supply and to be alternately powered by the electrical energy from the thermoelectric generator upon detecting the level of electrical energy from the power supply is substantially at or below a threshold level.

36. (Original) The fuser system of claim 35, wherein the threshold level is substantially equal to zero.

37. (Original) The fuser system of claim 35, wherein the controller is further configured to cause the cooling device to be alternately powered by the electrical energy from the thermoelectric generator upon detecting that electrical energy from the thermoelectric generator is at a level greater than the level of electrical energy from the power supply.

38. (Currently Amended) The fuser system of claim ~~34~~35, wherein the thermoelectric generator comprises:

a Peltier device operating in a Seebeck mode.

39. (Currently Amended) The fuser system of claim ~~34~~35, wherein the thermoelectric generator has a first surface mechanically coupled and thermally coupled to a housing of the laser printer and a second surface thermally coupled only to the fuser to thereby allow removal of the print fuser from the imaging device.

40. (Original) The fuser system of claim 39, wherein a heat conducting elastomer has a first major surface adhered to the second surface of the thermoelectric generator and a second major surface that contacts the fuser.

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41. (Currently Amended) The fuser system of claim 3435, wherein the electrical energy comprises a voltage.
42. (Currently Amended) The fuser system of claim 3435, wherein the cooling device is configured to reduce the temperature of the fuser.
43. (Currently Amended) The fuser system of claim 3435, wherein the cooling device comprises at least one exhaust fan that generates an air flow.
44. (Currently Amended) A method of cooling a print imaging device comprising:
converting heat generated by a print element of the imaging device to electrical energy; and
cooling the print imaging device with powering a cooling device; ~~with the electrical energy;~~
monitoring a level of electrical energy provided by a power supply; and
powering the cooling device normally with the electrical energy from the power supply and alternately powering the cooling device with the electrical energy from the converting upon detecting a level of electrical energy from the power supply is at or below a threshold level.
45. (Currently Amended) The method of claim 44, wherein the converting further comprises:
positioning a thermoelectric generator so as to have a first surface thermally coupled to the print element and a second surface thermally coupled to a housing of the print imaging device, wherein the thermoelectric generator converts heat from the print element to the electrical energy.
46. (Previously Presented) The method of claim 45, further comprising:
positioning the cooling device proximate to the print element to reduce the temperature of the print element.

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47. (Currently Amended) A cooling system in an imaging device having a print element that generates heat, the cooling system comprising:

means for converting heat generated by the print element to electrical energy;

means for monitoring a level of electrical energy from a power supply; and

means for cooling the imaging device that is normally powered by the electrical energy from the power supply and alternately powered by the electrical energy from the heat converting means upon detecting a level of electrical energy from the power supply is at or below a threshold level.